

Case 3187

***Isoospora* Schneider, 1881 (Protista, Apicomplexa): proposed designation of *I. suis* Biester, 1934 as the type species**

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Abstract. The purpose of this application is to designate *Isoospora suis* Biester, 1934 (family SARCOCYSTIDAE) as the type species of *Isoospora* Schneider, 1881. At present the nominal species *I. rara* Schneider, 1881 is the type species by monotypy, but the original material (cysts recovered from a slug, and probably of avian origin) does not exist and the species is unrecognisable from its description; it probably belonged to the EIMERIIDAE. The name *Isoospora* is in wide use for parasitic coccidia which are of medical and veterinary importance because they cause the disease isosporosis in mammals, including man. To stabilise this usage it is proposed that *I. suis* Biester, 1934, which causes isosporosis in pigs, should be designated as the type species.

Keywords. Nomenclature; taxonomy; Protista; Apicomplexa; Coccidia; SARCOCYSTIDAE; EIMERIIDAE; *Isoospora*; *Isoospora rara*; *Isoospora suis*; coccidiosis; isosporosis; isosporiasis.

1. The genus *Isoospora* Schneider, 1881 (Protista, Apicomplexa) is at present used to include several hundred species of coccidia infecting vertebrates, including man; several species are of economic and medical importance since they cause diseases known as isosporosis (or isosporiasis).

2. Schneider (1881, p. 401) established the generic name *Isoospora* for the nominal species *I. rara*, described from cysts recovered from a slug (“une petite Limace noire”, later suggested to be *Limax cinereoniger*). *I. rara* is thus the type species of *Isoospora* by monotypy. The deposition of type material was not mentioned and none is known to exist, and nor has the species been recognised since its original inadequate description.

3. It has recently been shown from molecular data, as well as morphology, that *Isoospora* (as at present used) is polyphyletic and that parasites previously included in this genus actually belong to two different apicomplexan families: the EIMERIIDAE and the SARCOCYSTIDAE (see Carreno & Barta, 1999). The only reason for the traditional congenericity of these two groups is the superficially similar organisation of exogenous stages. Morphological features corresponding with molecular data typical for each lineage have been repeatedly demonstrated (for example, see Box, Marchiondo, Duszynski & Davis, 1980). Species included in the nominal genus *Isoospora* which infect mammals represent a morphologically uniform group of coccidia closely related to the medically important genera *Toxoplasma*, *Neospora*, *Hammondia* and *Besnoitia* of the SARCOCYSTIDAE. In contrast, a second group of ‘isoporans’ evidently belongs to the EIMERIIDAE (Carreno & Barta, 1999).

4. In an attempt to resolve the problem of the identity of the type species *I. rara*, numerous slugs belonging to the families LIMACIDAE and ARIONIDAE have been examined. Isolates of the various coccidia that were found are apparently of pseudoparasitic origin. The ability of slugs to ingest stages of coccidia by coprophagy and their ability to carry and expel unchanged cysts have been proven experimentally (D. Modrý and others, unpublished). Therefore, a pseudoparasitic origin of *Isoospora rara* is suggested.

5. The species *Isoospora suis* Biester, 1934 (p. 106) is the most important member of the genus, having a significant economic impact on pig farming. *I. suis* is evidently congeneric with other monoxenous isosporan coccidia of medical importance, as documented by morphological and molecular biological studies, including rDNA sequences available in GenBank (Biester, 1934; Biester & Murray, 1934a, b; Carreno et al., 1998).

6. I propose that *Isoospora suis* Biester, 1934 should be designated as the type species of *Isoospora* Schneider, 1881 in order to stabilise the use of the name *Isoospora* for the important lineage of parasites in the family SARCOCYSTIDAE which cause mammalian isosporosis. A simple check on the Internet for the name *Isoospora* will show that at least 90% of current papers using the name deal with species belonging to this mammalian/human group of isosporans. The typification of *Isoospora* by *I. suis* will allow the usage of *Diploospora* Labbé, 1893 (p. 407; type species *Isoospora lacazei* Labbé, 1893, from the goldfinch *Carduelis carduelis*) for members of a quite distinct group of coccidia (family EIMERIIDAE) parasitic in birds and reptiles, to which the unrecognisable *Isoospora rara* probably belonged.

7. The International Commission on Zoological Nomenclature is accordingly asked:

- (1) to use its plenary power to set aside all previous fixations of type species for the nominal genus *Isoospora* Schneider, 1881 and to designate *Isoospora suis* Biester, 1934 as the type species;
- (2) to place on the Official List of Generic Names in Zoology the name *Isoospora* Schneider, 1881 (gender: feminine), type species by designation in (1) above *Isoospora suis* Biester, 1934;
- (3) to place on the Official List of Specific Names in Zoology the name *suis* Biester, 1934, as published in the binomen *Isoospora suis* (specific name of the type species of *Isoospora* Schneider, 1881).

References

- Biester, H.E. 1934. *Isoospora suis*, n. sp. from the pig. Pp. 106–107 in Becker, E.R., (Ed.), *Coccidia and coccidiosis of domesticated, game, and laboratory animals and of man*. Collegiate Press, Ames, Iowa.
- Biester, H.E. & Murray, C. 1934a. The occurrence of *Isoospora suis* n. sp. in swine. *Journal of the American Veterinary Medical Association*, **84**: 294.
- Biester, H.E. & Murray, C. 1934b. Studies in infectious enteritis of swine. VIII. *Isoospora suis* n. sp. in swine. *Journal of the American Veterinary Medical Association*, **85**: 207–219.
- Box, E.D., Marchiondo, A.A., Duszynski, D.W. & Davis, C.P. 1980. Ultrastructure of *Sarcocystis* sporocysts from passerine birds and opossums: comments on classification of the genus *Isoospora*. *Journal of Parasitology*, **66**: 68–74.
- Carreno, R.A. & Barta, J.R. 1999. An eimeriid origin of isosporoid coccidia with Stieda bodies as shown by phylogenetic analysis of small subunit ribosomal RNA gene sequences. *Journal of Parasitology*, **85**: 77–83.

- Carreno, R.A., Schnitzler, B.E., Jeffries, A.C., Tenter, A.M., Johnson, A.M. & Barta, J.R.** 1998. Phylogenetic analysis of coccidia based on 18S rDNA sequence comparison indicates that *Isospora* is most closely related to *Toxoplasma* and *Neospora*. *Journal of Eukaryotic Microbiology*, **45**: 184–188.
- Labbé, A.** 1893. Sur les coccidies des oiseaux. *Comptes Rendus de l'Académie des Sciences*, (3)**117**: 407–409.
- Schneider, A.** 1881. Sur les psorospermies oviformes ou coccidies. Espèces nouvelles ou peu connues. *Archives de Zoologie Experimentale et Générale*, **9**: 387–404.
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